state of the fungus was not observed by VON LAGERHEIM,[30] or by MAGNUS,[31] and has never been found by the reviewer. Even at a very early stage a definite mycelium appears to be present in the host plant, the hyphae of which are bounded by a thin wall. The ends of these hyphae form small swellings or vesicles which are active in dissolving the walls of the host cells. The method of branching of the hyphae and the development of the resting spore have been studied, and they seem to agree very closely with the descriptions given by SCHROETER,[32] MAGNUS, and VON LAGERHEIM for this fungus and for others which they consider closely allied to it. It is hoped to publish shortly a full account of this investigation and of a number of infection experiments undertaken in connection with several outbreaks of the disease in this country.—JAMES LINE, *Botany School, Cambridge, England.*

Radio-active material.—BLACKMAN[33] gives an extremely clear statement of the possible significance of radio-activity in normal physiological processes. He discusses mainly the work of the Dutch investigator H. ZWAARDEMAKER (Jour. Physiol. **53**:273–289. 1920), in which he found that various radio-active materials would maintain or induce heartbeat in a potassium-free Ringer solution. This is taken as evidence that the effectiveness of potassium salts on heartbeat is due to the radio-activity of potassium, for in equal radio-active concentration uranium and radium were equally effective with potassium. Potassium gives only β-radiations. Elements that emit only α-radiations were also effective in inducing and effecting heartbeat.

"The mode of action of these corpuscular radiations is not clear. The charged particles as they shoot along will act by induction, detaching everywhere electrons from these atoms; they also transfer kinetic energy, and when they come to rest on, say, some colloidal complex of the cell, they will transfer their electric charge and so may set free some ion absorbed on the surface. Whatever the nature of the action, ZWAARDEMAKER concludes that radio-activity is a mighty biological factor capable of restoring a lost function." BLACKMAN believes that this may explain, in part, the function of potassium in the plant.—WM. CROCKER.

Subalpine lake shore vegetation.—To his already extensive studies of Colorado mountain vegetation, RAMALEY[34] has recently added a report based upon a ten years' study of numerous subalpine lakes located at altitudes of 10,000–11,300 ft. in the Rocky Mountains of Colorado. Data are presented

[30] VON LAGERHEIM, G., Bihang K. Svenska Vet. Akad. Hand. **24**: no. 4. 1898.

[31] MAGNUS, P., Ann. Botany **11**:87. 1897; Ber. Deutsch. Bot. Gesells. **20**:291–296.

[32] SCHROETER, J., Bot. Centralbl. **11**:219–221. 1882.

[33] BLACKMAN, V. H., Radio-activity and normal physiological function. Ann. Botany **34**:299–302. 1920.

[34] RAMALEY, F., Subalpine lake shore vegetation in north central Colorado. Amer. Jour. Bot. **7**:57–74. *figs. 6.* 1920.

regarding topography, climate, and soil, and the typical zonation of the vegetation is outlined. These lakes are within the limits of the *Picea Engelmanni* forest, and the succession from the water's edge includes moor, heath, and meadow associations. Different expressions of these types are to be seen about the various lakes, the moor, with its variations of moss moor, sedge moor, rush moor, willow moor, and meadow moor, usually occupying a large proportion of the area. Perhaps the most interesting of the communities is the heath, in which *Gaultheria humifusa*, *Vaccinium caespitosum*, and *Kalmia microphylla* are conspicuous. Any one of these small undershrubs or a combination of all three may dominate a comparatively narrow belt of vegetation midway between the lake and the forest. The several aspects of the associations are noted, the meadows affording the most brilliant and varied display. Maps, diagrams, quadrats, and lists of species make the report graphic and exact.—GEO. D. FULLER.

Accessory foods for plants.—BOTTOMLEY[35] has found several chlorophyll bearing water plants unable to develop normally in nutrient salt solutions not bearing accessory organic foods. The plants worked on were as follows, naming them in descending order of their dependence upon the organic material: *Lemna major* and *L. minor*, *Salvinia natans*, *Azolla filiculoides*, and *Limnobium stoloniferum*.

"The effective organic substances were found to be present in an autoclaved growth of *Azotobacter chroococcum*, crude nucleic acid derivatives from raw peat, and a water extract of bacterized peat. . . . . In no case did the organic substance supplied exceed 184 parts per million, while the concentration of inorganic salts in the culture solution totaled 5500 parts per million."

The author thinks that these plants in nature secure their necessary organic materials from the waters in which they grow. From the work of BOTTOMLEY and of several other investigators who have recently published their results, it appears that accessory foods may have considerable significance in plant development, as they have very great significance in animal nutrition and growth.—WM. CROCKER.

Rate of photosynthesis in the field—MCLEAN[36] of the Philippines has worked up a simple method of measuring the amount of carbon dioxide absorbed by leaves in the open. There is certainly great need of such methods for determining photosynthetic rates as well as the rates of other plant processes occurring in the field. Recently a farmer who had fertilized heavily with rock phosphate and limestone asked why his corn with about the same foliage stores more than twice as much starch in the ears as his neighbor's corn for

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[35] BOTTOMLEY, W. B., The effect of organic matter on the growth of various water plants in culture solutions. Ann. Botany 34:353–365. 1920.

[36] MCLEAN, F. T., Field studies of the carbon dioxide absorption of coconut leaves. Ann. Botany 34:367–389. 1920.